We claim:

1. A substance delivery apparatus for use with a system for supplying breathable gas to a human or animal, the apparatus including:

means to measure the pressure of the supplied breathable gas;

means to detect inhalation by the human or animal; and

means to deliver the substance to the human or animal during inhalation at a pressure higher than the supplied pressure of the breathable gas.

2. An apparatus as claimed in claim 1, wherein the substance is a medicinal substance.

3. An apparatus as claimed in claim 1, wherein the substance is in the form of a gas, mist, aerated suspension, jet, spray, gas mixture or the like.

4. An apparatus as claimed in claim 1, wherein the substance is delivered to the respiratory system of the human or animal.

5. An apparatus as claimed in claim 4, wherein the substance is delivered to the nasal airways of the human or animal.

6. An apparatus as claimed in claim 1, wherein the supplied breathable gas is pressurised above atmospheric pressure.

7. An apparatus as claimed in claim 1, wherein the system for supplying breathable gas includes a pressurized gas flow generator in fluid communication with a mask worn by the human or animal via a flexible conduit, and the inhalation detection means includes an airflow sensor adapted to measure the volumetric flow rate of the breathable gas passing through the conduit and generate a first input signal indicative of the breathable gas flow rate.

8. An apparatus as claimed in claim 7, further including a first amplifier to amplify the first input signal into a second input signal also indicative of the breathable gas flow rate.

9. An apparatus as claimed in claim 7, further including a differentiating filter to derive the first signal into a third input signal indicative of acceleration or

deceleration of the breathable gas to thereby indicate inhalation or exhalation respectively.

10. An apparatus as claimed in claim 7, wherein the mask includes a gas washout vent to atmosphere and the airflow sensor is disposed downstream of the vent such that inhalation can be detected by sensing a reversal of the direction of the breathable gas flow through the vent.

11. An apparatus as claimed in claim 10, wherein inhalation is detected by sensing an interruption of the breathable gas flow through the vent.

12. An apparatus as claimed in claim 1, further including means to measure the volume of the substance to be delivered to the human or animal.

13. An apparatus as claimed in claim 1, wherein the pressure measuring means is a pressure transducer connected to the conduit, said transducer being adapted to generate a fourth input signal indicative of the pressure of the breathable gas in the conduit.

14. An apparatus as claimed in claim 13, including a second amplifier to amplify the fourth input signal into a fifth input signal also indicative of the breathable gas pressure.

15. An apparatus as claimed in claim 1, wherein the substance delivery means is a positive displacement pump.

16. An apparatus as claimed in claim 15, wherein the positive displacement pump is a diaphragm pump.

17. An apparatus as claimed in claim 16, wherein the diaphragm pump is in fluid communication with a substance reservoir via a one-way valve adapted to allow the substance to only pass from the reservoir to the diaphragm pump.

18. An apparatus as claimed in claim 16, wherein the diaphragm pump is in fluid communication with the gas supply conduit via a one-way valve adapted to allow the substance to only pass from the diaphragm pump to the conduit.

19. An apparatus as claimed in claim 16, wherein the diaphragm pump is displaced by a linear drive means.

20. An apparatus as claimed in claim 19, wherein the linear drive means is an electromagnet.

21. An apparatus as claimed in claim 16, wherein the diaphragm of the diaphragm pump is displaced by a rotary to linear converter driven by a rotary drive means.

22. An apparatus as claimed in claim 21, wherein the rotary drive means is an electric DC motor, an electric AC motor, a stepper motor or a brushless motor.

23. An apparatus as claimed in claim 19, further including a first control system having input means adapted to allow the input of a predetermined sixth input signal indicative of the volume of the substance to be delivered and a predetermined seventh input signal indicative of the amount by which the pressure of the delivered substance should exceed the pressure of the supplied breathable gas, said first control system being adapted to receive the second, third, fifth, sixth and seventh input signals and calculate and generate a first output signal indicative of the amount of displacement of the linear or rotary drive means and a second output signal indicative of the direction of the displacement required to produce a negative or positive pumping pressure.

24. An apparatus as claimed in claim 23, wherein a negative pumping pressure draws the substance from the substance reservoir into the pump and a positive pumping pressure expels the substance from the pump to the conduit and so to the human or animal.

25. An apparatus as claimed in claim 24, wherein the first and second output signals are sent to a second control system adapted to convert them into third and fourth output signals indicative of drive means displacement and direction respectively, the third and fourth output signals being compatible with the linear or rotary drive means.

26. An apparatus as claimed in claim 25, wherein the input and output signals can be analog and/or digital.

27. A method of delivering a substance to a human or animal being supplied with breathable gas, the method including the steps of:

measuring the pressure of the supplied breathable gas;

detecting inhalation by the human or animal; and

delivering the substance to the human or animal during inhalation at a pressure higher than the supplied pressure of the breathable gas.

28. A method as claimed in claim 27, wherein the substance is a medicinal substance.

29. A method as claimed in claim 28, wherein the substance is in the form of a gas, mist, aerated suspension, jet, spray, gas mixture or the like.

30. A method as claimed in claim 27, wherein the substance is delivered to the respiratory system of the human or animal.

31. A method as claimed in claim 30, wherein the substance is delivered to the nasal airways of the human or animal.

32. A method as claimed in claim 27, wherein the supplied breathable gas is pressurised above atmospheric pressure.

33. A method as claimed in claim 27, including the steps of measuring the volumetric flow rate of the breathable gas with an airflow sensor and generating a first input signal indicative of the breathable gas flow rate.

34. A method as claimed in claim 33, including the step of amplifying the first signal into a second signal also indicative of the breathable gas flow rate.

35. A method as claimed in claim 33, including the step of differentiating the first signal into a third signal indicative of breathable gas acceleration or deceleration to indicate inhalation or exhalation respectively.

36. A method as claimed in claim 27, including the step of measuring the volume of the substance to be delivered to the human or animal.

37. A method as claimed in claim 36, wherein the breathable gas pressure is measured with a pressure transducer adapted to generate a fourth input signal indicative of the breathable gas pressure.

38. A method as claimed in claim 37, including the step of amplifying the fourth input signal into a fifth input signal also indicative of the breathable gas pressure.

39. A method as claimed in claim 27, wherein the substance is delivered to the human or animal using a positive displacement pump.

40. A method as claimed in any one of claim 39, wherein the positive displacement pump is a diaphragm pump.

41. A method as claimed in any one of claim 40, wherein the diaphragm pump is in fluid communication with a substance reservoir via a one-way valve adapted to allow the substance to only pass from the reservoir to the diaphragm pump.

42. A method as claimed in claim 40, wherein the diaphragm pump is also in fluid communication with the gas supply conduit via a one-way valve adapted to allow the substance to only pass from the diaphragm pump to the conduit.

43. A method as claimed in claim 40, wherein the diaphragm pump is displaced by a linear drive means.

44. A method as claimed in any one of claim 43, wherein the linear drive means is an electromagnet.

45. A method as claimed in claim 40, wherein the diaphragm pump is displaced by a rotary to linear converter driven by a rotary drive means.

46. A method as claimed in claim 45, wherein the rotary drive means is an electric DC motor, an electric AC motor, a stepper motor or a brushless motor.

47. A method as claimed in claim 43, further including the steps of inputting the second, third, fourth, fifth input signals and a predetermined sixth input signal indicative of the volume of the substance to be delivered and a predetermined seventh input signal indicative of the amount by which the pressure of the delivered substance should exceed the pressure of the breathable gas into a first control means and the first control system adapted to generating a first output signal indicative of the amount of displacement of the drive means and a second output signal indicative of the

direction of the displacement required to produce negative or positive pumping pressure.

48. A method as claimed in claim 47, wherein a negative pumping pressure draws the substance from the substance reservoir into the pump and a positive pumping pressure expels the substance from the pump to the conduit and so to the human or animal.

49. A method as claimed in claim 48, further including the steps of inputting the first and second output signals into a second control system and the second control system adapted converting them into third and fourth output signals indicative of drive means displacement length and direction respectively, the third and fourth output signals being compatible with the linear or rotary drive means.